

From: [Hodgson, Rich](#)
To: [Stuble, Bill](#)
Cc: [Brichacek, Todd](#); [Potter, Dolly](#); [Morris, Cliff](#); [Slaybaugh, Kip](#); [Branson, Eric](#); [Vandendoren, Alain](#)
Subject: RE: SNCR Report / NOxOUT A Consumption JULY
Date: Tuesday, August 08, 2006 1:44:03 PM

Bill,

I don't think that the design NOx reduction percentage of 35% has any meaning in our system today. The system is clearly capable of much more than this if we were interested in lowering the emissions below our permit requirements. Assuming 0.39lb/hr of NOx for the Detroit Stoker FGR system is just a guess also and I think we routinely can do much better than this. I believe we overfired coal to the calciner during some days of the month and this would result in the generation of higher levels of NOx since the furnace runs hotter.

Rich

From: Stuble, Bill
Sent: Tuesday, August 08, 2006 2:22 PM
To: Vandendoren, Alain; Brichacek, Todd; Potter, Dolly; Morris, Cliff; Branson, Eric; Slaybaugh, Kip; Hodgson, Rich
Subject: SNCR Report / NOxOUT A Consumption JULY

The SNCR system ran 674 hours in July and consumed 32,897 lbs urea solution. Costs are reported as follows and compared to the month of June and original design / planning. Note that SNCR startup was June 13.

The process shall be tuned up and more accurate numbers shall be available in future months. There was not a good balance of urea (converted to NH3) in and NH3 out (NH3 slip + NH3 reacted with NOX). Fuel Tech will be asked about this.

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The SNCR system again performed better than expected as ammonia slip was assumed to be only about 2.5 ppm versus 15 ppm design. The Detroit Stoker system likely again had better than design NOx emissions, hence requiring less reagent, although it was not tested with the SNCR system turned off. And, CA-2 capacity ran below design (drag conveyor limited).

One caveat in July was the CA-2 coal firing rate per ton of ore was much higher than compared to June, which may have produced more Nox subject to control and reaction.

Note the percentage NOx reduction achieved by SNCR in July -- did not meet design. It was 30.8% versus 35% design. NOx reduction performance and operating conditions are detailed as follows:

<< OLE Object: Picture (Metafile) >>

-- Bill

[William E. \(Bill\) Stuble](#)

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All numbers "per furnace" basis.

	June, 2006 <u>CA-2</u>	July, 2006 <u>CA-2</u>	Fuel Tech Proposal & Calcinator 080105
	<u>Typical or Est</u>	<u>Typical or Est</u>	
	<u>Measured</u>	<u>Measured</u>	<u>Design</u>
<u>COSTS</u>			
Urea cost, \$/lb solution delivered	0.16	0.16	0.157
Urea cost, \$/ton solution delivered	319.74	319.74	313.43
Urea cost, \$/month	1,858	5,259	12,759
Urea cost, \$/tORE	0.06	0.08	0.15
Urea cost, \$/ton Nox removed	713	1,014	1,685
<u>UREA USAGE</u>			
Urea sol'n consumption, lbUREA/month	11,622	32,897	81,413
SNCR hours of operation / month	280	674	621
Urea consumption, lb/h	42	49	131
Urea consumption, gal/h	4.4	5.1	13.8
Urea consumption, gal/y	32,499	38,215	102,755

PROCESS

Calcliner Ore Feed Rate, tORE/h	115	99	140
Furnace Heat Load MM Btu/Hr	133	128	155
Furnace Outlet Temp deg F	1680	1680	1718

non-SNCR controlled NOX, lb/MM Btu	0.39	0.39	0.45
non-SNCR controlled NOX, lb/hr	51.9	50.0	69.8
non-SNCR controlled ppm NOX			231
non-SNCR controlled NOx, tNOX/y	193	186	260

SNCR controlled NOX, lb/MM Btu	0.250	0.270	0.293
SNCR controlled NOX, lb/hr	33.3	34.6	45.3
SNCR controlled NOx, tNOX/y	124	129	169
SNCR NOX reduction, %	35.9	30.8	35.0

NOX reduction tNOX/y	69	57	91
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Nox - Urea - NH3 Balance Check

Ammonia slip, ppm, furnace outlet			15.0
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Ammonia slip, ppm, stack outlet	2.5	2.5	14.9
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Ammonia Slip, % of urea consumption	3.1	2.5	6.9
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In

Urea feed, pure urea, lb/hr	20.8	24.4	65.6
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Converted to NH3, lb/hr	11.8	13.8	37.2
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Total NH3 in, lb/hr	11.8	13.8	37.2
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Out

Ammonia Slip, lb/hr	0.6	0.6	4.5
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Ammonia reacted w / NO, lb/hr	7.0	5.8	9.2
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Total NH3 out, lb/hr	7.7	6.4	13.8
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